

10/525 499

(12) INTERNATIONAL APPLICATION PUBLISHED UNDER THE PATENT COOPERATION TREATY (PCT)

(19) World Intellectual Property Organization International Bureau



(43) International Publication Date
4 March 2004 (04.03.2004)

PCT

(10) International Publication Number
WO 2004/019392 A2

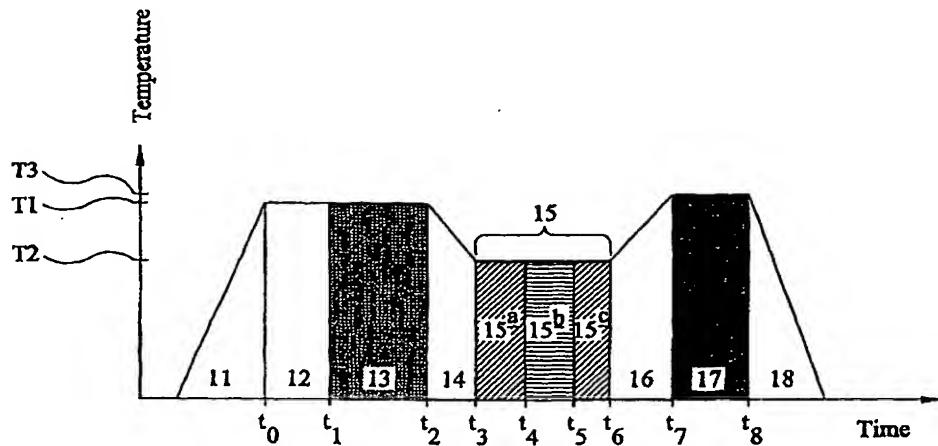
(51) International Patent Classification⁷: H01L 21/203
(21) International Application Number:
PCT/JP2003/010420
(22) International Filing Date: 18 August 2003 (18.08.2003)
(25) Filing Language: English
(26) Publication Language: English
(30) Priority Data:
0219729.1 23 August 2002 (23.08.2002) GB
(71) Applicant (for all designated States except US): SHARP KABUSHIKI KAISHA [JP/JP]; 22-22, Nagaikacho, Abeno-ku, Osaka-shi, Osaka 545-8522 (JP).
(72) Inventors; and
(75) Inventors/Applicants (for US only): BOUSQUET, Valerie [FR/GB]; The Top Flat, Manor House, Henley Road, Sandford on Thames, Oxford OX4 4YN (GB). HOOPER, Stewart Edward [GB/GB]; 21 Thorne Close, Kidlington, Oxfordshire OX5 1SJ (GB). BARNES, Jennifer Mary [GB/GB]; 13 Larkfields, Headington, Oxford OX3 8PF (GB). HEFFERNAN, Jonathan [IE/GB]; 33 Denton Close, Oxford OX2 9BW (GB).
(74) Agents: YAMAMOTO, Shusaku et al.; Fifteenth Floor, Crystal Tower, 2-27, Shiromi 1-chome, Chuo-ku, Osaka-shi, Osaka 540-6015 (JP).
(81) Designated States (national): AE, AG, AL, AM, AT, AU, AZ, BA, BB, BG, BR, BY, BZ, CA, CH, CN, CO, CR, CU, CZ, DE, DK, DM, DZ, EC, EE, ES, FI, GB, GD, GE, GH, GM, HR, HU, ID, IL, IN, IS, JP, KE, KG, KP, KR, KZ, LC, LK, LR, LS, LT, LU, LV, MA, MD, MG, MK, MN, MW, MX, MZ, NI, NO, NZ, OM, PG, PH, PL, PT, RO, RU, SC, SD, SE, SG, SK, SL, SY, TJ, TM, TN, TR, TT, TZ, UA, UG, US, UZ, VC, VN, YU, ZA, ZM, ZW.
(84) Designated States (regional): ARIPO patent (GH, GM, KE, LS, MW, MZ, SD, SL, SZ, TZ, UG, ZM, ZW), Eurasian patent (AM, AZ, BY, KG, KZ, MD, RU, TJ, TM), European patent (AT, BE, BG, CH, CY, CZ, DE, DK, EE, ES, FI, FR, GB, GR, HU, IE, IT, LU, MC, NL, PT, RO, SE, SI, SK, TR), OAPI patent (BF, BJ, CF, CG, CI, CM, GA, GN, GQ, GW, ML, MR, NE, SN, TD, TG).

Published:

— without international search report and to be republished upon receipt of that report

[Continued on next page]

(54) Title: MBE GROWTH OF A SEMICONDUCTOR LAYER STRUCTURE



WO 2004/019392 A2

(57) Abstract: A method of MBE growth of a semiconductor layer structure comprises growing a first (Al,Ga)N layer (step 13) over a substrate at the first substrate temperature (T1) using ammonia as the nitrogen precursor. The substrate is then cooled (step 14) to a second substrate temperature (T2) which is lower than the first substrate temperature. An (In,Ga)N quantum well structure is then grown (step 15) over the first (Al,Ga)N layer by MBE using ammonia as the nitrogen precursor. The supply of ammonia to the substrate is maintained continuously during the first growth step, the cooling step, and the second growth step. After completion of the growth of the (In,Ga)N quantum well structure, the substrate may be heated to a third temperature (T3) which is greater than the second substrate temperature (T2). A second (Al,Ga)N layer is then grown over the (In,Ga)N quantum well structure (step 17).

BEST AVAILABLE COPY



For two-letter codes and other abbreviations, refer to the "Guidance Notes on Codes and Abbreviations" appearing at the beginning of each regular issue of the PCT Gazette.